



**M9**

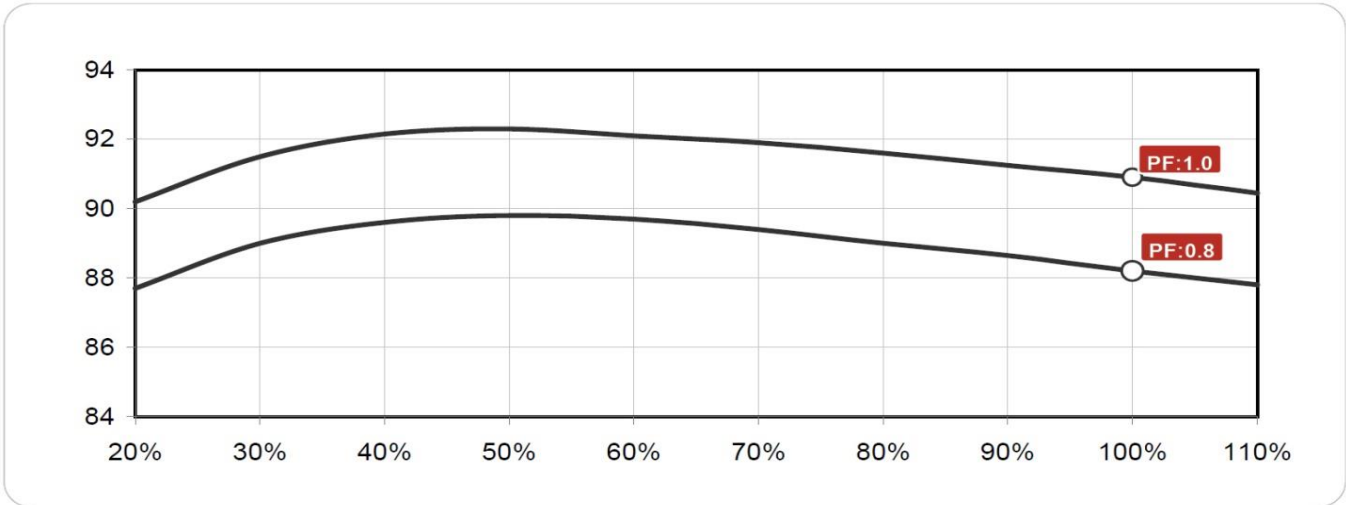
CONT 8.1 kVA



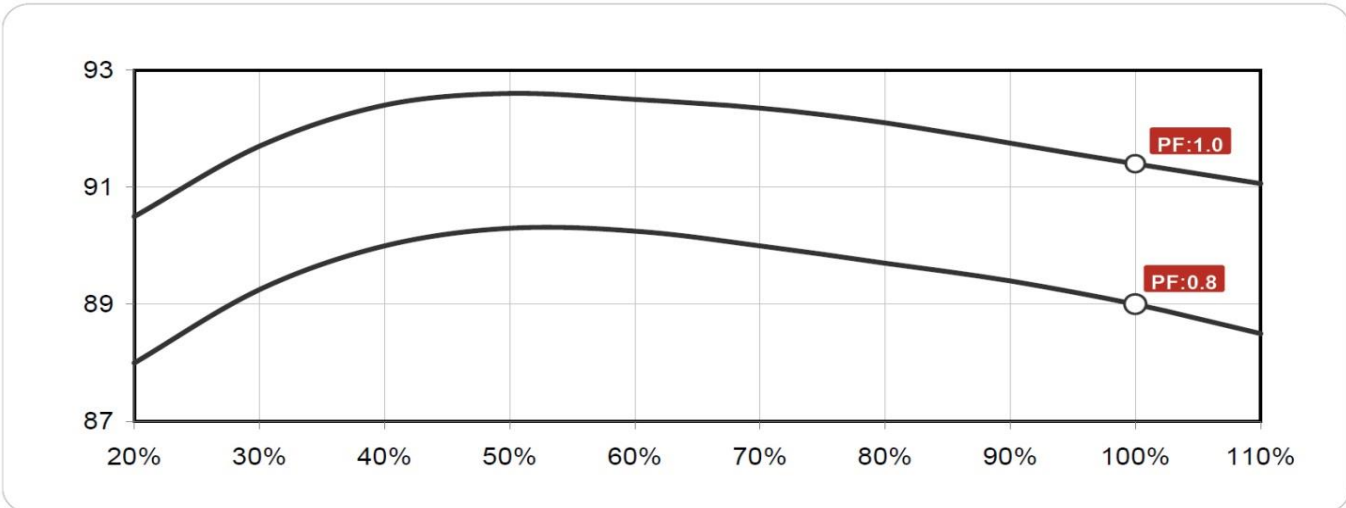


# Efficiency and Motor Starting

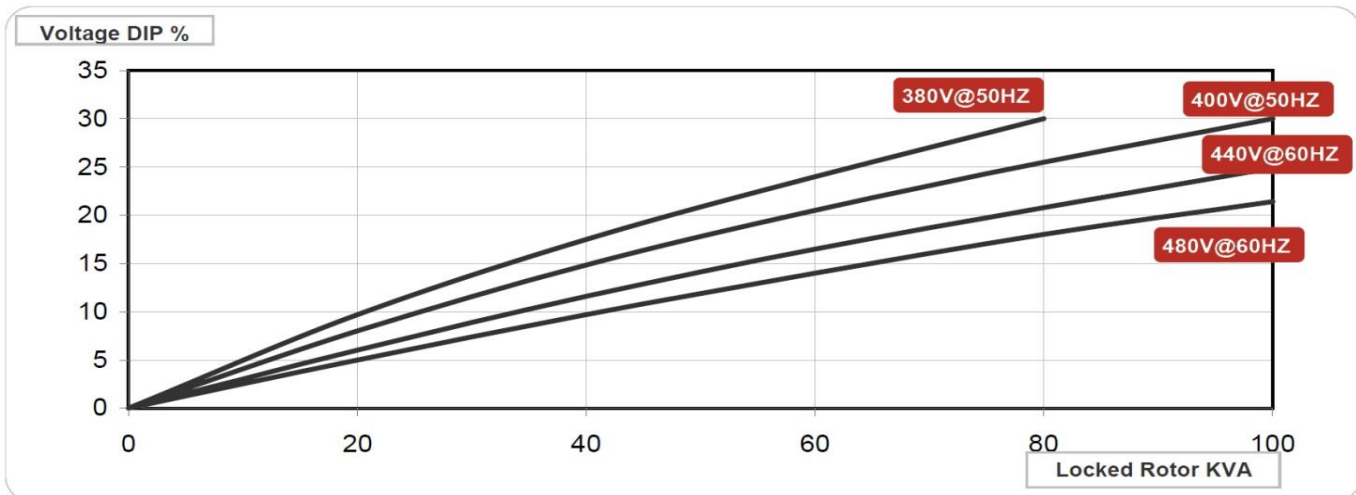
## Efficiency Curve @ 50 Hz, 400V



## Efficiency Curves @ 60 Hz, 480V



## Motor Starting Curves @ 50 Hz, 60 Hz Locked Rotor



## Technical Data Sheet

|                      | STANDARD(S)    | OPTIONAL(O) | INFORMATION (I) | SPECIFICATION  |
|----------------------|----------------|-------------|-----------------|--|
| EXCITATION SYSTEM    | SELF-EXCITED   | <b>S</b>    |                 | SUSTAINED SHORT-CIRCUIT: NOT AVAILABLE                       |
|                      | ARAP           |             |                 |  |
|                      | PMG            |             |                 |  |
| AVR                  | SX460          | <b>S</b>    |                 | REGULATION PRECISION : +/-1,0 %                              |
|                      | SX440          | <b>O</b>    |                 | REGULATION PRECISION : +/-1,0 %                              |
|                      | MX341          |             |                 |  |
|                      | MX321          |             |                 |  |
| WINDING INSULATION   | H              | <b>S</b>    |                 |  |
|                      | F              |             |                 |  |
| WINDING PITCH        | 2/3            | <b>S</b>    |                 | HIGHER FLEXIBILITY IN USE,BETTER MOTOR STARTING ABILITY      |
|                      | 5/6            | <b>O</b>    |                 | COST-EFFECTIVE POWER SUPPLY SCHEME                           |
| WINDING PROTECTION   | STANDARD       | <b>S</b>    |                 |  |
|                      | "ANTI-HARSH"   | <b>O</b>    |                 | SPECIAL TREATMENT OF WINDING TO AGINST HASRH ENVIROMENT      |
|                      | SPACE HEATER   | <b>O</b>    |                 | TO HEAT UP AIR TO REMOVE THE HUMMINITY AROUND WINDING        |
|                      | THERMAL SENSOR | <b>O</b>    |                 | TO DETECT THE WINDING TEMPERATURE OR BEARING'S               |
| PARALLEL OPERATION   | CT100          | <b>O</b>    |                 |  |
|                      | CT200          |             |                 |  |
|                      | CT400          |             |                 |  |
|                      | CT600          |             |                 |  |
|                      | CT1000         |             |                 |  |
| WINDING LEADS        | 12             | <b>S</b>    |                 | 12 LEADS OF WINDING ENDS,                                    |
|                      | 6              | <b>O</b>    |                 | 6 LEADS OF WINDING ENGS                                      |
| MACHINE PROCTIION    | IP23           | <b>S</b>    |                 | STANDARD MACHINE PROTECTION                                  |
|                      | IP44           | <b>O</b>    |                 | TO AGINST : 1mm OBJECT AND SPLASHING WATER                   |
|                      | IP54           |             |                 |  |
| POWER FACTOR         | 1              | <b>O</b>    |                 |  |
|                      | 0,8            | <b>S</b>    |                 |  |
| CONNECTION TO ENGINE | SINGLE BEARING | <b>S</b>    |                 |  |
|                      | DOUBLE BEARING | <b>O</b>    |                 |  |
|                      | BELT DRIVE     | <b>O</b>    |                 |  |
|                      | VERTICAL       |             |                 |  |
| OVERSPEED            |                |             | <b>I</b>        | MAX ROTATING SPEED : 2250 RPM                                |
| ATTITUDE             | <=1000m        |             | <b>I</b>        | DERATING IS NO NEED  |
|                      | >1000m         |             | <b>I</b>        | DERATING NEEDED, REFERS TO RATING BOOK                       |
| ELECTIRICAL FEATRUES | TDF/THC        |             | <b>I</b>        | NO LOAD < 1,5 %, NON DISTORATING BALANCED LINEAR LOAD< 5,0 % |
|                      | TIF            |             | <b>I</b>        | <50  |
|                      | THF            |             | <b>I</b>        | <2%  |
| BEARING              | DRIVE -END     |             | <b>I</b>        | BALL 6309 - 2RS DOUBLE BEARING : 83 KG                       |
|                      | NON DRIVE END  |             | <b>I</b>        | BALL 6309 - 2RS  |
| WEIGHT               | NET            |             | <b>I</b>        | SINGLE BEARING 80 KG DOUBLE BEARING : 83 KG                  |
|                      | GROSS          |             | <b>I</b>        | SINGLE BEARING 108 KG DOUBLE BEARING : 111 KG                |
| PACKING SIZE         |                |             | <b>I</b>        | SINGLE B. : 1120 x680x700 mm DOUBLE B. : 1120X680X700        |

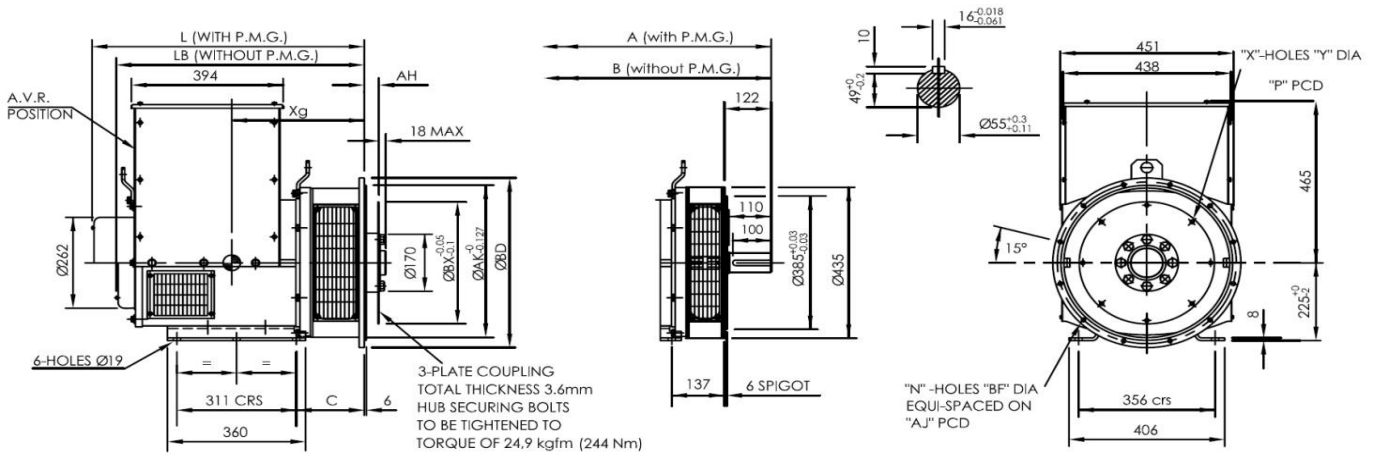
# Technical Data Sheet

## STANDARD(S) OPTIONAL(O) INFORMATION (I)

## SPECIFICATION

|  |        |       |       |       |       |       |       |       |
|--|--------|-------|-------|-------|-------|-------|-------|-------|
| SERIES STAR (V)  | 380    | 400   | 415   | 440   | 416   | 440   | 460   | 480   |
| PARALLEL STAR (V)                                      | 190    | 200   | 208   | 220   | 208   | 220   | 230   | 240   |
| SERIES DELTA (V)                                       | 220    | 230   | 240   | 254   | 240   | 254   | 266   | 277   |
| Xd - Direct axis synchro. Reactance unsaturated        | 1,994  | 1,800 | 1,672 | 1,994 | 2,367 | 2,248 | 2,054 | 1,899 |
| X'd - Direct axis transient reactance saturated.       | 0,204  | 0,184 | 0,171 | 0,199 | 0,242 | 0,230 | 0,210 | 0,193 |
| X''d - Direct axis sub transient reactance saturated   | 0,127  | 0,115 | 0,107 | 0,124 | 0,152 | 0,144 | 0,132 | 0,121 |
| Xq - Qadro. Axis synchro.reactance unsaturated.        | 0,992  | 0,895 | 0,831 | 0,967 | 1,177 | 0,117 | 1,022 | 0,939 |
| X''q - Quadro. Axis sub transient reactance saturated. | 0,229  | 0,207 | 0,192 | 0,223 | 0,272 | 0,258 | 0,236 | 0,217 |
| X2 - Negative sequence reactance unstrated             | 0,191  | 0,172 | 0,160 | 0,186 | 0,226 | 0,215 | 0,197 | 0,181 |
| Xo -Zero sequence reactance unsaturated.               | 0,086  | 0,078 | 0,072 | 0,064 | 0,103 | 0,098 | 0,089 | 0,082 |
| T'd- Short - Circuit transient time constant           | 0,012s |       |       |       |       |       |       |       |
| T''d - Sub Transiet time constant                      | 0,003s |       |       |       |       |       |       |       |
| T'do- Open circuit time constant                       | 0,2s   |       |       |       |       |       |       |       |
| Ta- Armature time constant                             | 0,004s |       |       |       |       |       |       |       |
| Kcc - Short Circuit Ratio                              | 1/Xd   |       |       |       |       |       |       |       |

## Outline Drawing



| DIMENSIONS(mm) |         |     |     |     | 2-BRG |     |
|----------------|---------|-----|-----|-----|-------|-----|
| SAE            | TYPE    | LB  | L   | Xg  | A     | B   |
| SAE 1          | SMF225C | 661 | 724 | 333 | 792   | 729 |
| SAE2/3/4       | SMF225C | 647 | 710 | 321 |       |     |

| COUPLING DISC |        |        |   |      |      |  |
|---------------|--------|--------|---|------|------|--|
| SAE           | BX     | P      | X | Y    | AH   |  |
| 14            | 466.72 | 438.15 | 8 | 13.5 | 25.4 |  |
| 11.5          | 352.42 | 333.38 | 8 | 11   | 39.6 |  |
| 10            | 314.32 | 295.28 | 8 | 11   | 53.8 |  |
| 8             | 263.52 | 244.48 | 6 | 11   | 62   |  |

| FLANGE(mm) |     |        |        |      |    |       |
|------------|-----|--------|--------|------|----|-------|
| SAE        | BD  | AK     | AJ     | BF   | N  | C     |
| SAE4       | 402 | 361.95 | 381    | 11   | 12 | 177   |
| SAE3       | 451 | 409.58 | 428.62 | 11   | 12 | 177   |
| SAE2       | 490 | 447.68 | 466.72 | 11   | 12 | 177   |
| SAE1       | 553 | 511.18 | 530.22 | 12.7 | 12 | 191.3 |

Maranello designs, manufactures and markets the alternators which comply with the national and international standards. The alternator can be broadly used in the all-purposed application, such as backup, rental, telecom and marine, and also can be used in a.

### **Compliant with Standards**

Other certifications can be considered on request.

### **Electrical Features**

#### **Automatic Voltage Regulator (AVR)**

The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.

#### **2/3 Winding Pitch**

Effectively eliminates the effect of the third harmonics so as to avoid excessive neutral currents.

#### **Variable Voltage Output**

Standard voltage output can be achieved through the reconnectable 12 wire, and the beyond-the-standard voltage might be achieved by optional winding.

#### **Overload Capability**

Be capable of running at constant load limited to the insulation class with the possibility of overload up to 10% for 1 hour every 12 hours.( Continuous Duty -S1).

#### **High Efficiency and Motor Starting Capacity**

Optimizing design greatly improves the efficiency and motor starting capacity.

### **Mechanical Features**

#### **Bracket + Flexible Disc**

The combination of casting bracket and flexible disc makes product to be coupled with any brand of engine whose interface is international design

#### **Terminal Box**

Metal-made and accessed easily, it also can be customized on requests.

#### **Shaft and Key**

Rotors assembly is dynamically balanced under ISO8528 and BS5000 regulation, and double-bearing is balanced with half-key.

#### **Bearing**

Bearing is greased in the factory for life, and regreasable bearing is available on request.

#### **Machine Protection**

The standard protection is IP23, and IP44 is optional

### **Insulation and Impregnation**

#### **H-class Insulation**

Materials used in the insulation system is classed "H", specially the copper wire applied is able to withstand 200°C

#### **Vacuum Pressure Impregnation (VPI)**

The advanced impregnation equipment is applied to ensure the electrical insulation and mechanical strength.

### **Winding Protection**

#### **Standard:**

The winding is protected against relative humidity < 95%.

#### **Optional:**

The special-treated winding ("ANTI-HARSH") is recommended to apply for the environment humidity > 95%, or harsh environment such as atmospheric contaminants or salty water spr